National Environmental Science Program

Sustainable Communities and Waste Hub
Research Plan 2023

Introduction

The National Environmental Science Program

The National Environmental Science Program (NESP) is a long-term commitment by the Australian Government to environment and climate research. The program:

- provides evidence for the design, delivery and on-ground outcomes for environmental programs
- helps decision-makers, including from Indigenous communities, to build resilience
- supports positive environmental, social and economic outcomes.

The first phase of NESP invested over **$145 million** (2014–15 to 2020–21) into 6 research hubs and emerging priority research projects. The second phase is investing **$149 million** (2020–21 to 2026–27) into 4 new research hubs. These hubs are:

- Resilient Landscapes Hub
- Marine and Coastal Hub
- Climate Systems Hub
- Sustainable Communities and Waste Hub

The NESP is administered by the Department of Climate Change, Energy, the Environment and Water (the Department). More information on the NESP is available at dcceew.gov.au/science-research/nesp

Department role

The 4 NESP hubs have been formed to conduct applied research within their specific themes. Each activity year the Department will work with the Minister, the hubs and other key stakeholders to identify and refine research priorities and develop projects that align with these priorities.

This annual review and evaluation of research outputs and impact provides the flexibility needed for the hubs to engage in new themes of research in an adaptive manner, and ensures that the focus is on the delivery of relevant and practical research. Hubs are responsible for co-design of the research projects in consultation with research-users and in partnership with relevant Indigenous communities. Hubs are also responsible for monitoring and evaluating the research project outcomes during the life of the hub.

The research prioritisation is a rolling process and will be informed by key milestones in each activity year, such as the annual progress report and submission of the next research plan.

Hub role

The Sustainable Communities and Waste (SCaW) Hub is a consortium comprising five world-class research institutions led by the University of New South Wales, Sydney (UNSW), including the Commonwealth Scientific and Industrial Research Organisation (CSIRO), Monash University (Monash), the University of Tasmania (UTas) and Curtin University (Curtin).

The Hub provides a collaboration space for academics, government, industry and the community, with the shared objective of enhancing sustainable community outcomes and reducing negative waste impacts.

Our research agenda is co-designed with the Department and other research-users at all levels of government, industry, non-government organisations (NGOs), national associations and Indigenous and other community groups in urban, regional and remote Australia.

Our Vision

Healthy, resilient, connected and prosperous urban, regional and remote communities with reduced impact on the environment.

Creating more sustainable communities and reduced waste impact through innovative and collaborative solutions. Transitions to healthier, resilient and prosperous urban, regional, and Indigenous communities.

Building enduring relationships and sustainable communities with our First Nations Peoples.

Improving environmental outcomes through better management of waste, pollution and air quality, adoption of nature-based solutions, and strengthening our connection to nature. Improving the liveability of our cities, regions and remote areas.

Increasing prosperity and jobs creation by aligning and boosting Australia's recycling and manufacturing capability.

Transforming waste materials via new science for the creation of end-user focused, scalable and local waste-to-value solutions.

Purpose of this Research Plan

This Research Plan 2023 (RP2023) was developed by the SCaW Hub, in consultation with the Department and other research-users, to address key priorities identified during co-design discussions that occurred through RP2021 and RP2022. These are summarised in the 'Research' section of this plan, and outlined in Attachments A and B. The majority of projects commenced in RP2022 and span multiple years. These will continue to be refined with our research-users through the life of the Hub. Several projects provide opportunity for cross-hub coordination, and activities have been built into projects to work closely with key researchers in other NESP hubs to coordinate efforts, especially through the Initiatives. Ongoing engagement with the Department is paramount.

RP2023 will be delivered, in accordance with, and guided by our agreed Hub strategies for knowledge brokering, data management, Indigenous partnerships and communications. These strategies provide direction on Indigenous engagement, data management, communication and knowledge product outputs.

The purpose of the Research Plan 2023 is to outline:

- the research priorities the Hub is funded to investigate, including those related to the crosscutting initiative the Hub is funded to lead

- the research projects that will address these priorities

- how the research projects will be co-designed and delivered to research-users

- how the outputs of the research will be communicated with key stakeholders

- how hubs will work collaboratively within and across hubs.

This research plan also provides summary information on the management and governance of the Hub, including the broad funding profile, key staff and research organisations, and the risks that need to be monitored and managed to ensure success.

Initiatives

In addition to its hub-level research projects, each hub is also responsible for delivering a cross-cutting Initiative and contributing research to other initiatives where appropriate. The Initiative includes cross-hub collaboration and may include multiple projects to deliver management options, data and information for the themes listed below.

The 4 initiatives are:

Initiative	Lead Hub
Protected Place Management	Marine and Coastal
Threatened and Migratory Species and Threatened Ecological Communities	Resilient Landscapes
Waste Impact Management	Sustainable Communities and Waste
Climate Adaptation	Climate Systems

For the SCaW Hub, the Waste Impact Management Initiative involves cross-hub collaboration and may include multiple projects to deliver management options, data and information. Where appropriate, SCaW projects will also undertake research to support the SCaW-led Initiative as well as other hub initiatives.

Emerging priorities

Each year, specific emerging priorities may be identified by the Department, hubs or third parties for delivery as research projects. If endorsed by the Department, a hub will develop research project/s to address the emerging priority.

Hubs are flexible and adaptable to respond to emerging priorities, with the ability to rapidly scale output, bring in external expertise or respond if additional resources are made available. Hubs are required to set aside 10% of NESP funding being spent per calendar year (in any category) so they can respond to emerging priorities; these funds can be rolled into the subsequent year if they are not used.

Emerging priority projects are developed outside a hub's annual research proposal process. Once emerging priority projects have been approved, a hub's research plan and activity budget for the

relevant calendar year will be amended, and emerging priorities will be included in the hub's annual progress reports.

One emerging priority was identified for the SCaW Hub in late September 2022. The Hub was approved to undertake a scoping study into 'Environmental Indicators for Wellbeing and Productivity' in response to the request from the Department. The emerging priority research plan is described in more detail in Attachment B.

Research

Research priorities

The SCaW Hub is committed to a body of activity that includes short- and long-term research projects, and the Waste Impact Management Initiative.

Broadly, the research priorities of the ScaW Hub are:

- targeted information and management tools to reduce the impact of plastic and other material on the environment
- applied scenario modelling to support sustainable people-environment interactions in communities, including urban heat island impacts and liveability analysis
- effective and efficient management options for hazardous waste, substances and pollutants throughout their lifecycle to minimise environmental and human health impacts
- maintained and improved air quality
- cross-hub coordination for the 'waste impact management' initiative to support decision maker policy development, program management and regulatory processes in both marine and terrestrial environments.

Key Thematic Areas

SCaW Hub projects impact across 3 thematic areas:

- **Sustainable Communities** explores ways to enhance and inform sustainable social outcomes, policy and cultural challenges, and the health, wellbeing and liveability of Place, including what is needed to protect, preserve and increase prosperity.

- **Waste Resources** explores the ways that a range of materials, such as microplastics, tyres and e-waste can be recovered and revalued through innovative technological solutions, and a better understanding of waste flows through society.

- **Remote & Regional Solutions** explores how place-based, fit-for-purpose solutions can be developed as a response to local needs across Australia, in remote and regional communities as well as urban. It focuses on building economies of purpose rather than purely economies of scale.

Impact Priority Areas & Projects

The SCaW Hub has 5 Impact Priority (IP) Areas that collectively are delivering outcomes against the 3 thematic areas. Each of these IP areas comprises of several research projects, identified and developed through co-design during RP2021 and RP2022, led by collaborations of researchers across institutions. Each of the projects are briefly outlined below, with more detail provided in Attachments A & B.

All projects were approved under RP2022, with some seeking amendments to budget and/or scope for RP2023.
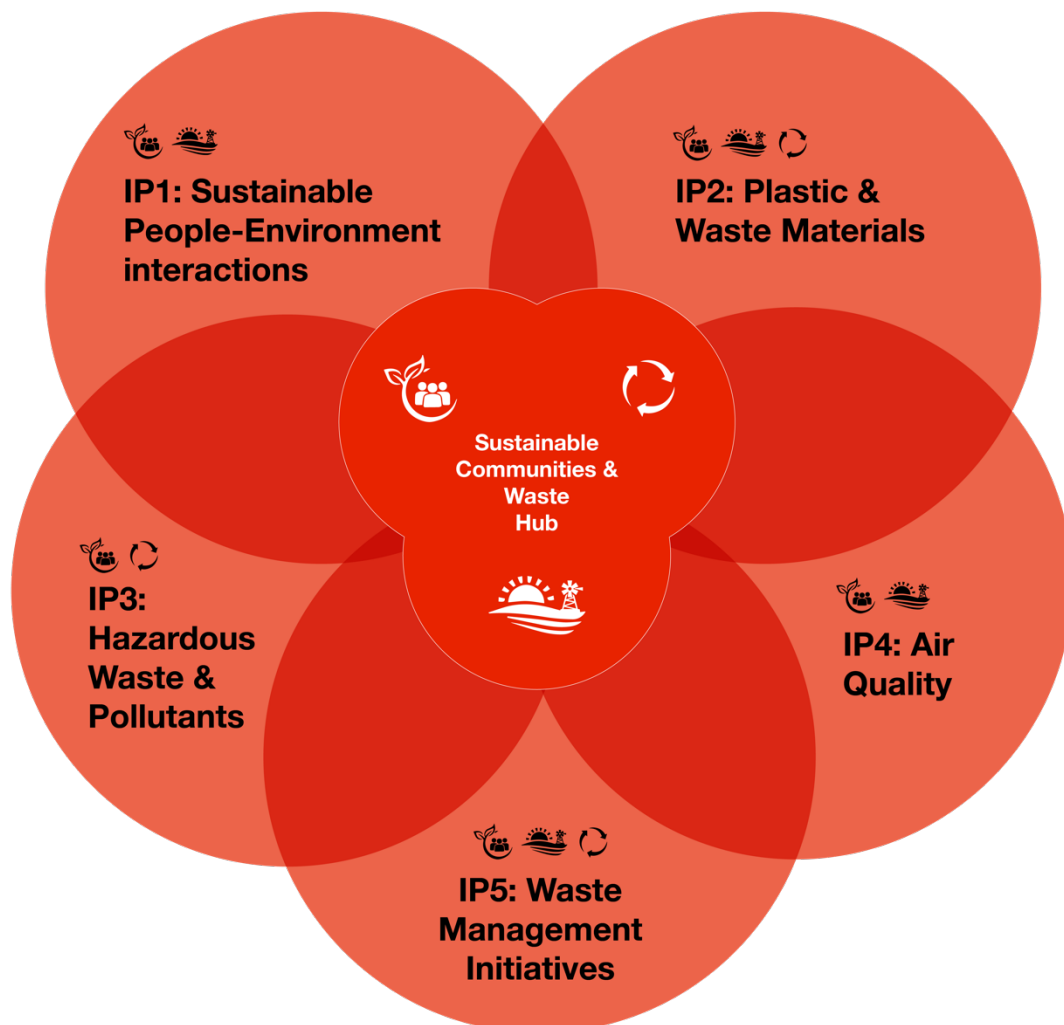
IP1.02 - Sustainable People–Environment Interactions

Description

IP1 explores links between human wellbeing, and environmental and ecosystem health. Through research and collaboration and using a Nature-based Solutions (NbS) lens, this research will develop knowledge and tools to inform and stimulate change for the shared benefit of humans and nature.

This Impact Priority area also aims to empower regional, remote and Indigenous communities to become more sustainable and their areas liveable and help support the delivery of *Australia's Strategy for Nature 2019–2030*, *National Climate Resilience and Adaptation Strategy 2021–2025*, and a renewed *National Water Initiative 2004*.

Key Projects

- *IP1.02.01: Nature connection*

The Nature Connection Project aims to increase benefits for humans and the environment derived from valuing nature, through understanding nature connection in the Australian context, and identifying and supporting strategies to maximise positive impacts on health, wellbeing and sustainability for all Australians.

- *IP1.02.02: Water sensitive and liveable communities*

This research will help respond to the urgent call in the national discourse for research to support regional and remote communities and their local institutions to develop more effective ways to empower their voice and sovereignty in decisions that impact on their way of life, especially around areas such as water management.

Thematic Areas

- Sustainable Communities
- Remote & Regional Solutions

IP2.02 – Reduced Impact of Plastics and Other Materials

Description

IP2 investigates approaches to reduce the impact of plastics and other waste materials.

Key Projects

- *IP2.02.01: Understanding Microplastics*

This project seeks to address the concerns raised by councils, industry, governments and communities over microplastics and component materials to directly address gaps on the prevalence and impact of microplastic pollution. This includes understanding the sources and generators of microplastics and the development of a national protocol for measuring and monitoring microplastics, providing deeper insights for policy.

- *IP2.02.02: Finding fit-for-purpose technological recycling solutions for regional and remote communities across Australia*

This project seeks to identify and trial fit for purpose technological recycling solutions, utilising hub and spoke models for remote/very remote, inner and outer regional communities across Australia. A number of case studies will provide the ground-truthing for solutions and provide lessons learned and stories to build the capacity of other communities.

Thematic Areas

- Waste Resources
- Remote & Regional Solutions
- Sustainable Communities

IP3.02 – Management of hazardous waste, substances and pollutants

Description

Through the generation of high-quality data related to the mass and potential availability of chemicals in our waste streams, IP3 will assist safe recovery and reuse of resources obtained from wastes and enable national resource recovery targets.

Key Projects

- *IP3.02.01: Quantifying mass and potential release of chemicals of potential concern in our wastes and recovered resources*

This project will develop robust and representative sampling and reporting methods, waste characterisation, and environmental and ecotoxicological risk definition for chemicals of potential concern (CoPC) identified in end-of-life tyres and e-waste. The project seeks to generate data that are discoverable, accessible, and reusable, can easily be integrated and interpreted for other applications, and will be used to inform risk-based decisions regarding the management, treatment, and safe reuse of these wastes.

Thematic Areas

- Waste Resources
- Sustainable Communities

IP4.02 – Improved Air Quality, Forecasting and Assessment

Description

IP4 explores how to reduce air pollution and its impacts in Australia.

Key Projects

- *IP4.02.01: Let's yarn about smoke*

Bringing together practitioners from air quality, Indigenous health, and fire and land management domains with government and community stakeholders, this project aims to learn from, and where possible, support existing Indigenous-led actions towards improving air quality and health. It also seeks to identify opportunities to co-design air quality research, resources and tools that address

Indigenous identified priorities for managing the impact of landscape smoke on the health of communities.

- *IP4.02.02: How will a changing climate and emissions reduction measures impact sources of air pollution and secondary pollutant formation?*

The project is a modelling study that will provide a lens on how altered we can expect air quality to be under future emission scenarios in Australia. It will leverage modelling capability in the Climate Systems Hub and will contribute to cross hub Initiative activities. The research outcomes will be used by government agencies for managing future changes to air quality and health.

- *IP4.02.03: Woodheaters: developing and testing novel solutions to a persistent problem.*

This multi-year program aims to implement and evaluate novel solutions to wood heater emissions to (a) directly inform policy and (b) support the scaling up of successful interventions.

- *IP4.02.04: Evaluation of interventions to reduce air pollution in safe havens and use of Low-Cost Sensors to identify areas of concern*

This project aims to provide up to date guidance on the choice and use of low-cost sensors and HEPA filters in the Australian context. Part of this project will include working with manufacturers to develop plain-English education material and programs to ensure research users understand the capacities and limitations of these technologies.

Thematic Areas

- Remote & Regional Solutions
- Sustainable Communities

IP5.02 Waste Impact Management Initiative

Description

IP5 focuses on providing information, data and management tools; informing design for repurposing waste and circular economy; informing the institutional and governance needs of community-based resource recovery and circular economy initiatives; and waste management and resource recovery opportunities for Indigenous communities.

Key Projects

- IP5.02.01 - Australian Metrics for Materials, Waste and Resource Recovery summarised in a Circularity Gap Report and Dataset

- IP5.02.02 - Exploring Opportunities for increasing value recovery from used Tyres and Conveyor Belts in Western Australia

- IP5.02.03 - Governing Community Based Resource Recovery and Circular Economy Initiatives

- IP5.02.04 - Scoping study creating opportunity from waste in Aboriginal communities in Western Australia

- IP5.02.05 - Place Based Cross-Hub Integration Project

Thematic Areas

- Waste Resources
- Sustainable Communities
- Remote & Regional Solutions

Expected outcomes and outputs

The expected outcomes of NESP are to produce research that:

- enhances our understanding of Australia's environment and climate

- is communicated clearly to relevant stakeholders and the public

- is discoverable and accessible

- informs decision-making and addresses environmental priorities.

Research under the NESP is expected to inform the Department's policy and program delivery. More broadly, it will engage and inform key stakeholders with an interest in the outputs of environmental and climate science research, including state and local governments, business and industry, community groups, Indigenous land managers, Indigenous communities and education institutions.

Hub outcomes and outputs

The SCaW Hub is enabling a systemic, transformative response to Australia's sustainability, waste and pollution challenges through the integration of key research fields, including ecology, engineering, environmental monitoring, public health, data science, technology, behavioural change, environmental economics, business innovation, design, and regional and urban planning.

The research of the SCaW Hub is being undertaken across many parts of Australia's urban, regional and remote communities and environment. Working closely with all levels of government, private industry, NGOs and communities - including Indigenous - to co-design and co-implement research projects and co-create knowledge products, will provide positive outcomes towards solving the complex waste and sustainability problems that negatively impact society and the environment. Governance, community participation and Indigenous knowledge underpin our co-design approach. We aim to produce actionable knowledge, methods, tools and data for transitions towards circular economies and more sustainable communities.

Key outcomes and outputs of specific Impact Priority areas are outlined in Attachment B and summarised below.

Informing policy and frameworks

- **National Waste Policies**

  o Informing waste management policy design and decision making for the Department and government (at all levels) via community co-designed solutions for addressing waste management, including for microplastics and in regional and remote communities.

- **Nature-Based Solutions Policies**

  o Data and knowledge to enable federal, state and local governments to better report on national and international policies, outcomes and obligations (e.g. *Australia's Strategy for Nature 2019–2030*, *National Climate Resilience and Adaptation Strategy 2021–2025*,

National Water Initiative, Closing the Gap, Protecting Victoria's Environment – Biodiversity 2037, Sustainable Development Goals (SDGs), Aichi targets, post-2020 Global Biodiversity Framework, Ramsar triennial reporting to the conference of the Contracting Parties, post United Nations Framework Convention on Climate Change Conference of Parties 26, World Heritage Convention, IUCN).

- **Remote & Regional Water-Sensitive Community Frameworks**

  o Foregrounding Indigenous water research frameworks and methods – developing, identifying, and sharing ontologies, governances and values to better inform and develop water policy, frameworks and management in Australia.

- **Waste Demographic Frameworks**

  o Input to waste sampling, characterisation, and risk assessment methodologies to frame waste management policies around products and articles in Australia.

- **Air Quality & Emissions Planning**

  o Improved guidance on the use of HEPA filters for air quality in public spaces, guidelines on the selection and use of low-cost sensor networks for the management of local air quality problems and a roadmap for interventions to reduce exposure on high air pollution days.

  o Modelling on air quality under future emission scenarios in Australia which can be used by government agencies for managing future changes to air quality and health.

- **Circular Economy Decision Making**

  o Metrics and data on material flows, waste, emissions, resource recovery and circular economy for decision makers in federal, state and local governments and for businesses in the waste management and resource recovery sector.

Community benefits

- **Improving Health**

  Reduction of exposure of Australian communities to poor air quality, microplastics and other hazardous chemicals from waste stockpiles.

  o Plain English guidance for the use of HEPA cleaners and outcomes of the comparison testing and intervention studies, to assist the public and stakeholders to make more informed decisions on purchasing cleaners to reduce their exposure to air pollution.

- **Enhanced Connections to Nature**

  o Quantifying, characterising and mapping Australian experiences and impacts of nature connection and pathways for a more nature-connected society and empowered Indigenous communities.

- **Waste Reduction**

  o Increasing materials circularity in Indigenous, remote, regional and urban Australian communities. This outcome will contribute to the delivery of the National Waste Policy 2018" and the "National Waste Policy Action Plan, particularly the goals of "Helping to reduce total waste generated by 10% per person by 2030" and "Significantly increase the use of recycled content by governments, consumers and industry".

- **Community & Indigenous Participation**

  o Identification of the governance and water system changes necessary to deliver water outcomes supportive of Indigenous communities.

  o Greater understanding of knowledge exchange/capacity building for regional and remote communities, including championing Indigenous thought leaders and change champions to challenge the water and land management sectors.

  o Training and leadership to support Indigenous-led transformation in the water sector/industry and land and sea management.

  o Greater participation in research around waste and air quality, and uptake of research outcomes, by community stakeholders, and especially Indigenous researchers and stakeholders.

- **Greater Understandings on Circular Economy and Waste**

  o Enhanced circular economy networks among community, government and industry actors in regional Australia and reduced waste generation in regional Australia.

Economic Benefits

- **Wellbeing Benefits**

  o Data and knowledge to support economic evaluations of the benefits of a society that connects with and values nature.

- **Circularity Solutions**

  o Innovative recycling and re-manufacturing solutions for waste streams, including plastics, tyres, and e-waste.

- **Supply Chain Opportunities**

  o Catalysing waste supply chains and creating new markets.

- **Waste & Emissions Analytics**

  o Providing industry and non-government stakeholders confidence and evidence to make decisions regarding business and investment for treatment, resource recovery and product development from hazardous wastes.

  o Information on what drives individual decision making on wood heater use, HEPA cleaner purchases and low-cost sensor network installations. These can be used to understand potential economic choices.

Environmental Benefits

- **Relationships to Nature**

  o Greater understanding of the characteristics and benefits of nature connection across Australia and the strategies that can support Australians valuing, connecting with and benefiting from nature, while creating positive environmental outcomes.

- **Urban Greening**

  o Knowledge and tools to effectively and equitably support nature connection, urban greening and Nature-based Solutions across rural, regional and remote Australia.

- **Reduction of Waste Impacts**

  o Reducing the impacts of waste materials subject to the export ban as well as the effects of microplastics on the environment.

  o Tangible reductions in material use, waste to landfill and emission and environmental impacts (climate change, natural resource depletion, biodiversity loss, toxic waste issues) for communities and businesses.

  o Accelerating the diversion of hazardous waste from the environment and ensuring safe reuse of waste in new products in ecological settings.

- **Improved Air Quality**

  o Understanding which interventions result in increased human and environmental health outcomes. Successful interventions should see an increase in ambient air quality, with a reduction in the pollutants being emitted.

Partnerships & Collaboration

- **Diverse Stakeholder Partnerships**

  o New and strengthened partnerships among researchers, the Department, state environment agencies/departments, Indigenous groups, local communities, NGOs and other research-user partners.

  o Expanded and connected national network of key groups to create greater momentum in addressing state and federal hazardous waste diversion (from landfill) and resource recovery targets.

- **Strengthening Local Capacity**

  o Working with communities to strengthen their capacity for implementing fit for purpose waste management solutions.

- **Participatory Action Research**

  o Better understanding and inclusion of specific community needs, and ensuring diverse perspectives are incorporated into the research process, solutions and decision-making processes.

- **Transferring Learnings**

  o Reflecting on and refining localised research engagement and implementation approaches, so that they can be adapted to fit within other communities.

- **Indigenous Empowerment**

  o Greater understanding of methods that bring together knowledge systems to create frameworks and models for Indigenous-led and bi-cultural water governance and land management.

- **Cross-Hub Collaboration**

  o Deep collaboration with other NESP Hubs, such as Resilient Landscapes Hub, Climate Systems Hub, and Marine and Coastal Hub.

Hub Beneficiaries

The below list outlines broadly the types of users who will benefit from the SCaW Hub research.

- National, State, Regional and Local Government agencies and industries in the waste management and resource recovery sector

- Waste management authorities and industry associations

- Local authorities and communities

- Indigenous land and water councils and Indigenous communities

- Department of Climate Change, Energy, Environment and Water
  - Environment Protection Branch
  - Chemicals Management Branch
  - Waste Policy and Planning Branch
  - Waste Action and Modernisation Branch
  - Plastics, Packaging and Marine Debris Branch
  - Biodiversity Conservation Division
  - Heritage, Reef and Oceans
  - Biodiversity Policy & Water Science Branch
  - Environmental Science & Nature Based Solutions Branch
  - Protected Species and Communities Branch
  - Science partnership Branch

- All state and territory EPAs, and/or environment and primary industry departments

- Community groups, NGOs, national waste networks, water corporations and peak bodies

- Business and private sector industry partners engaged in conservation, plastics, air quality, wastes, water, agriculture, aquaculture, manufacturing.

Collaboration and partnerships

NESP encourages a collaborative, multi-disciplinary approach to environmental and climate research. Key to the success of the Hub will be the capacity to foster partnerships across hubs and with a wide range of decision-makers across the Australian community, including Indigenous communities, to achieve positive environmental, social and economic outcomes.

Co-design and co-production approaches to engagement and research are at the core of how the Hub collaborates with partners and other stakeholders. RP2021 and RP2022 were heavily influenced by stakeholder and research-user priorities and needs, to help shape the focus of SCaW Hub Outcomes. In RP2023, co-design continues to play a vital role in all IP projects, as a way for primary and some secondary stakeholders to help meaningfully inform and evolve the research and improve outcomes for communities and environment.

The SCaW Hub has three main layers of collaboration:

- *Internal Collaboration*, which includes cross-institutional collaboration across Impact Priority research areas
- *Stakeholder Collaboration*, which involves deep collaboration and co-production of research and knowledge with communities, research partners, and other research users
- *Cross-Hub Collaboration*, which involves collaboration with other NESP hubs on research projects.

The following is a condensed list of collaborators and partners connected to the SCaW Hub. Detailed lists can be found in IP-specific project plans in Attachment B.

Stakeholder	Description and relationship to SCaW Hub
UTas	The Healthy Landscape Research Group (Heal) that aims to understand the connections between the environment and human health - especially in the context of rural and regional areas and small cities. It uses that knowledge to drive and learn from local initiatives to provide health benefits for Tasmanians and make Hobart a leading "healthy regional city". Heal is currently undertaking a range of projects, including on urban and regional microbiomes; benefits of biodiversity and nature in small cities; the multiple social and health benefits of ecological restoration programs and community gardens; and dark skies conservation. Also, the Centre for Air pollution, energy and health Research (CAR).
CSIRO	CSIRO has several national programs related to plastics, critical energy metals, emissions issues, and organic waste. These are linked to government, industry and community interests, meshing strongly with the Hub vision. Health and environmental jurisdictions including the CSIRO/Bureau of Meteorology Smoke forecasting system (currently operating for fire agencies in Victoria and New South Wales).
UNSW	Various centres of excellence across UNSW, particularly the UNSW Sustainable Materials Research and Technology (SMaRT) Centre and its MICROfactorie technologies.
Monash	Monash was the lead in the Cooperative Research Centre (CRC) for Water Sensitive Cities, which wound up in June 2021, with the Water Sensitive Cities

Stakeholder	Description and relationship to SCaW Hub
	Institute, a SCaW Hub partner continuing to deliver against its mission to make cities more water sensitive.
	Monash is also leading two Circular Economy and Waste ARC Linkage and Discovery Projects.
	Behaviour Works at Monash has been collaborating since 2018 with Victorian and New South Wales -based policy partners to look at the issue of waste and how to encourage Australians to avoid, reduce, reuse and recycle waste and adopt circular economy approaches from a behavioural change perspective.
Curtin	Curtin's Sustainability Policy Institute and extensive Indigenous Knowledge research expertise.
State Environment Departments and EPAs	Victoria Department of Environment, Land, Water and Planning, Western Australia Department of Biodiversity, Conservation and Attractions, South Australia Department for Environment and Water, Tasmania Department of Primary Industries, Parks, Water and Environment, NSW Department of Planning, Industry and Environment, Parks Australia, Department of Defence.
State Health & Other Departments	Victoria, NSW, Tasmanian, WA Health Departments, Waste Authority WA, Development WA, Melbourne Water, Royal Botanic Gardens Victoria.
Various Local Governments	City of Knox, City of Melbourne, City of Fremantle, Perth City Council, and regional centres such as Launceston, Brighton (Tas), Ballarat, Bendigo, Shoalhaven City Council.
Aboriginal and Torres Strait Islander groups	Tasmanian Regional Aboriginal Communities Alliance (TRACA), Fisheries Research and Development Corporation Indigenous Reference Group, Dharriwaa Elders Group, Uraah Innovations and Cultural Services.
Environmental NGOs	Conservation Volunteers Australia, TierraMar, Landcare Tasmania, Tasmanian North East Bioregional Network, Planet Ark, Australasian Dark Skies Alliance, Health and Environment Alliance, Rethink Waste Tasmania, Australian Packaging Covenant Organisation, AUSMAP, Earthwatch Australia, Total Environment Centre.
Industry Associations	Water Services Association of Australia, Nursery and Garden Industry Victoria, Australian Tyre Recycling Association, Tyre Stewardship Australia, Circular Economy Networks and Hubs, Southern Waste Solutions, Asthma Australia, Charitable Recycling Australia, Tasmanian Farms & Graziers Association.
Private Enterprises	Molycop, Textile Recycling Australia, Tree Dimensions, Scape, Kandui Technology, Tellus Holdings, Veolia, Environex, Edge Environment, RAWTEC, Blue Environment.
External Linkages	Through the Hub's universities and CSIRO, links with leading external researchers and universities globally. Hub research-users also have research and

Stakeholder	Description and relationship to SCaW Hub
	development (R&D) capability and connections – for example Water Research Australia – who link across all water utilities in Australia and their associated researcher cohorts. Such linkages will be brought to bear on the Hub and other NESP projects of scale and complexity where capability is not housed within Hub partners.

Impact Priority Area Collaborations

Several of the research projects within the Hub are collaborations between Impact Priority teams, with the research outcomes informing other IP areas within the Hub.
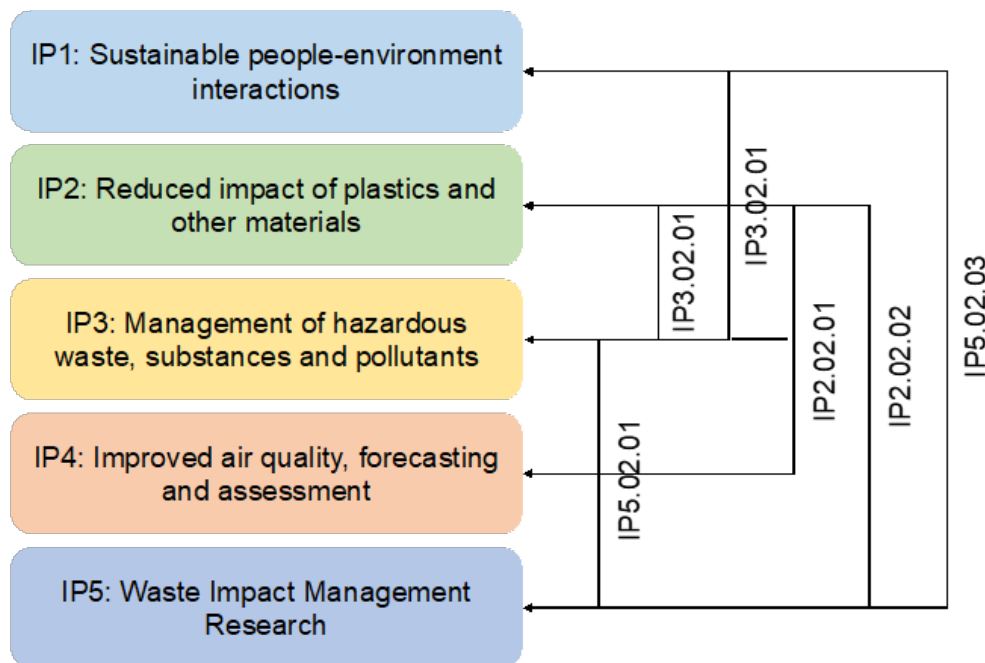
Cross-Hub Collaborations

Hub	SCaW Hub Collaborators
Resilient Landscapes Hub	IP2, IP5
Marine & Coastal Hub	IP2
Climate Systems Hub	IP1, IP4, IP5

Indigenous Partnerships

Our Hub aims to create sustained, resilient and strong partnerships with Indigenous Australians through Hub projects. We recognise this enables identification of areas and issues related to social, economic, cultural and spiritual significance to Indigenous communities. We also recognise the importance truly co-designed research has towards reconciliation and to realise opportunities of

mutual benefit to Indigenous and non-Indigenous research. The result is an advantage to Australia from both a research and environmental, social and economic perspective.

Our Indigenous partnership approach seeks to facilitate appropriate participation by Indigenous people, groups, and communities when undertaking research activities. We ensure compliance with Indigenous Cultural and Intellectual Property (ICIP) requirements. Our projects seek to provide investment to enhance Indigenous research capability, including in regional and remote Australia. Our approach embeds skilled transfer to Indigenous people but also Indigenous people sharing traditional knowledge and skills about sustainable communities and waste management with non-Indigenous people. Throughout the life of this Hub, we have and will continue to foster increased cultural awareness between members of the Hub, the participating nodes, and the communities where we will be conducting our research.

Our Hub's Indigenous Partnerships Strategy outlines criteria the projects need to address to ensure appropriate engagement with Indigenous Australians, and we use the Three Category Approach, a tool developed under NESP to assess each project and determine the appropriate level of partnership and engagement with Indigenous Australians.

The Hub's approach to ensuring all project and program management staff are cultural capability trained is detailed in the SCaW Indigenous Partnerships Strategy. All staff in the hub have been given opportunities to engage in a range of cultural capability activities including: Your Mob Learning online training (available to all and participation and completion is monitored and required before research plans are accepted). True Tracks Training has been offered in 2021, 2022 and the Hub is currently negotiating plans for 2023 together with the Indigenous Facilitation Network for a more cost-effective approach as a cross hub solution. The Hub has also had Indigenous Elders yarn about Indigenous priorities in community at Hub meetings. The Senior Indigenous Facilitator has joined cross hub panel discussions available online to speak about Indigenous engagement and ethics.

Knowledge Brokering, Communication and Data Management

NESP expects that each hub will engage and communicate research outcomes with research-users and the wider public to facilitate uptake and adoption. As part of this, the program is committed to promoting open access to public sector and publicly funded information, including optimising the use and reuse of data. It is expected that each hub will implement its data management plan to provide timely, open access to the data products and research outputs.

Knowledge Brokering

Knowledge brokering is a key function within the Hub that ensures that research projects are co-designed to meet the needs of research-users, and knowledge products are delivered in usable formats to generate research impact and to communicate the program level impact of the Hub.

The Hub's lead Knowledge Broker (KB) guides knowledge brokering activities and functions across the Hub, in partnership with the Department, all Hub partners, Indigenous facilitators and other NESP hubs, in accordance with the Hub's KB strategy. There is an active knowledge brokering presence across the Hub, with knowledge brokering roles in all Hub research institutions (also referred to as nodes), and in all Impact Priority projects, via a dedicated Hub KB group that meets regularly. Knowledge products are developed, in consultation with the research-users and via internal discussions between IPs and the KB and within the Hub KB group to ensure that individual projects

communicate and align with each other and the Hub's broader vision, while underway and once completed.

The KB group is involved in research project co-design across the Hub, supporting facilitated co-design workshops, connecting SCaW Hub researchers to research-users within the Department and external partners, communicating Hub research capability to research users, and ensuring that research-user priorities are addressed by Hub research plans. As well as the KB strategy, supporting material is being developed to guide Hub research-user engagement, co-design and knowledge translation activities.

Communications

Hub communication activities – at both Hub and/or Impact Priority project level – are guided by the strategic aims and objectives of the Hub, and in accordance with the Hub's Communications Strategy. Additional advice and guidelines, along with working documents, to assist with the implementation of the Communications Strategy and projects are provided on the Hub's dedicated SharePoint portal.

The Communications Strategy is being implemented in conjunction with the KB and data functions of the Hub. It considers strategies and plans for Indigenous participation, data, and individual projects, in addition to annual research plans and the Hub's guiding 'Strategy, governance and operating model' document.

A range of activities, including the ongoing interaction and engagement with the Department and internal Hub stakeholders, in addition to a cycle of regular meetings to address ongoing and emerging activities, ensures high- and low-level support across the Hub.

Knowledge products generated through the co-design phase are made publicly available through the Hub website, and in accordance with the Hub Data Management strategy. The co-design process identifies knowledge products to be delivered through RP2023, and data and information management plans are developed for each of these.

Data Management

The Hub's Data Management Strategy provides a framework for how the Hub and its researchers achieve findable, accessible, interoperable and reusable (FAIR) research products when project outputs and outcomes are produced. It is recognised that discipline-specific standards of data management apply, and researchers are required and expected to apply these standards wherever possible.

This data management function:

- guides data wrangling activities in the Hub, in particular outlining how the Hub manages data at all stages of research
- ensures that FAIR principles are embedded in all Hub activities, and that Hub activities are consistent with the NESP data and information guidelines
- provides clarity on the activities of data wrangling actor(s) in the Hub.

For the SCaW Hub, data management is guided by several existing programs and platforms, including the Australian National Data Common (ARDC), Australian Urban Research Infrastructure Network (AURIN), and Research Data Alliance groups on data management, physical samples, and research data collections.

The SCaW Hub brings through its members, an experienced and knowledgeable data management team already embedded in the SCaW research community. Additional resources from the ARDC bring standards, infrastructure knowledge and economies of scale. Data and information management planning is essential to achieve the successful delivery of open-access research.

Indigenous Data Sovereignty and Governance

Essential to advancing the Indigenous Partnership Strategy and RP2023 is the collaboration and alignment of activities relating to data, Indigenous partnerships and knowledge brokering, within the broader SCaW Hub and individual research projects.

Research with Indigenous people requires engagement, negotiation, and free prior and informed consent. Additionally, there must be an understanding and mutual agreement on the research undertaken. Researchers must inform Indigenous Peoples of the aims, methods, implications, and potential outcomes of research projects, so they can determine their interest in the project and provide appropriate contributions. Further, researchers must convey the intended use of collected data and resulting products developed from this data. Fair consideration must be given to Indigenous Cultural and Intellectual Property (ICIP) and permission for data use in line with the AIATSIS Code of Ethics principles (which include Indigenous data sovereignty and cultural governance).

Furthermore, as part of the SCaW Hub Indigenous partnership objectives and goals - and aligned to the National NESP Indigenous partnership principles - knowledge held by Indigenous peoples must be valued and protected throughout the partnership and arrangements must be made for the ongoing protection of data. The program, hubs and individual researchers must ensure all legal obligations are understood before collecting information (including an understanding of. free and prior informed consent) and be guided by the Global Indigenous Data Alliance (GIDA) objectives.

The Hub recommends and implements training with its researchers in the following topics: True Tracks regarding ICIP and the AIATSIS Code of Ethics. Additional training may include the Global Indigenous Data Alliance's CARE principles for Indigenous data governance Hub researchers.

For any given calendar year, the Hub funding for applied science, decision tools and practical management options must total at least 70% of the NESP funds. The balance of the NESP funds can be allocated between knowledge capture (10–20%), communication (5–10%), and administration (5–10%). Ten percent of the Hub's budgeted NESP expenditure (see above table) for the calendar year (regardless of the expenditure category) must be set aside for emerging priorities; this amount comes from within the above categories.

Below is the SCaW Hub allocation of funds to these categories.

Item	Required percentage range	Hub percentage
Applied science, decision tools and practical management options	$\geq$70%	70%
Knowledge capture	10-20%	10%
Communication	5-10%	10%
Administration	5-10%	10%

Under the terms of the funding agreement, the funds paid by the Department under NESP must be matched by recipient and other contributions, to a minimum total of 100% contribution for the life of the program.

Attachment C presents the activity budget tables for the Hub for calendar year 2021 onwards. Budget estimates are provided for current and future years. The tables include recipient and other contributions.

Attachments

- Attachment A – Sustainable Communities and Waste Hub research projects
- Attachment B – Sustainable Communities and Waste Hub project plans
- Attachment C – Sustainable Communities and Waste Hub activity budget
- Attachment D – Sustainable Communities and Waste Hub risk assessment and treatment plan

Annexure 1: NESP project assessment criteria

1.   **Identified research priority**

   - Does the project plan incorporate one or more of the research needs identified by the department for the hub?

   - How well does the project align with the NESP research scope overview and research priorities identified for the hub?

      o   Does the research approach clearly address one or more of the research priorities (for example, rather than the plan just saying it does)?

      o   How strong/direct is the link between the research proposal and the priorities identified? Is there a large proportion of the research that doesn't clearly address a priority?

   - Does the research clearly support policy development, environmental management, regulation and investment?

   - Is there a clear management action or policy development that could be taken as a consequence of the delivery of this project?

   - Does the project plan refer to responsibilities, policies or programs to which the research will be directly relevant?

      o   Does the project plan identify one or more departmental contacts, and were they consulted in the development of the draft? Were their suggestions taken on board?

   - At a hub level how much funding is proposed for projects addressing the same research priority? Is the distribution of funds across priorities appropriate?

2. **Outcomes and outputs**

   - Are the outcomes clearly articulated in the project plan and are they directed towards research-user needs/ practical management?

   - Is there is a path to adoption for the research outcomes? Does this include direct links to line areas and the responsibilities of the department?

   - Are the outputs of the project clearly described, with at least some tailored to support management/policy actions (i.e. to assist uptake of the research by the department and other research-users)?

   - If outputs are to be co-designed with stakeholders to directly meet their needs, is this clearly stated?

3. **Project design**

   - Is the project well designed?

   - Do you have any suggestions that would increase the value of the project?

- Is there is a clear link between the research and practical and tangible environmental outcomes (direct links or secondary links with a clear path to outcomes)?

- Could the research question or approach be refined to better suit research needs or the needs of other research-users? Are specific research questions clearly articulated, or is there a clear approach to doing so?

- Does the project leverage other programs or investments?

- Does the proposal refer to current and previous work (for example, previous Australian Government programs, state and territory government research), and clearly build on the outcomes of that work rather than duplicating it?

- Is there a process proposed that will review existing understanding to help identify gaps and specific research questions? Will this scanning or synthesis process consider relevant research beyond that done by the hub partners?

- Does the project intend to have ongoing co-design and implementation with research-users?

4.   Indigenous inclusion

- Do the projects have appropriate Indigenous consultation and engagement?

- Is there evidence that the Indigenous Partnership Principles will be applied?

5. Data management and accessibility

- Are the *NESP data management and information guidelines* being followed?

- Do the project proposals list a repository or repositories for data, and indicate timing for publishing of the data? Note: Timing of publication should be not more than 1 year after the end of the project.

- Have metadata standards been indicated? For example, ISO 19115-1, OGC or ISA 19139 MCP.

- If an exception is stated for sensitive data, cultural data or species data, does it align with the *NESP data management and information guidelines*.

- Has the hub indicated that publications will not be made open access? Note: All publications are to be open access at either the point of publication or at a specified future date.

- Has a data contact been specified for each project?

6. Knowledge brokering and communication

- Do the project proposals describe the approach to knowledge brokering and communication?

- Have specific communication and knowledge brokering actions and activities been included in the project proposals? For example:

  - how research-users will be engaged from the outset of the project

  - identified pathways to adoption by research-users

  - target audiences and stakeholders.

- Does the proposal align with the hub's knowledge brokering and communication strategies?

Supported	Supported with minor modifications	Supported with significant modifications	Defer for resubmission	Not supported

- Do the project proposals include a commitment to developing activities in an appropriate timeframe?

7.   Time and budget

- What are the risks associated with delivering the project on time and within budget?

- Are the management actions proposed to address these risks appropriate?

- Does the project approach represent the best and most efficient way of addressing the research need?

- What is the scale and scope of the research needed to deliver the research outcomes? Is it commensurate with the budget and time and resources allocated to the project?

8.   Project personnel

- Does the project team provide evidence that they have a history of delivering research that is useful and used by managers and policymakers?

- Is there evidence that their project meets the objectives of the program and requirements of the Funding Agreement?

- Has the project team demonstrated previous engagement with the department and other stakeholders in developing and delivering research?

- Is there any feedback from departmental staff involved in previous work delivered by this research group?

    o   If this feedback consolidates any concerns with the current project proposal, consider deferring or providing specific feedback.

Recommendation

The proposed project performs strongly against the majority of criteria, and there are no 'red flags'. It is well supported by research-users in the department	The proposed project would perform strongly against the majority of criteria if identified modifications are made prior to final assessment. 'Red flags' are relatively easily resolved or clarified.	Significant changes or significant additional information required. Red flags are addressed with considerable work.	Red flags are identified with significant changes or significant additional information required. Project proposal to be further developed and resubmitted.	Red flags are complex/time consuming to resolve. Project not well scoped/ does not meet department's needs.